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A comparison of items and constructs of standardised health-related quality of life and mental well-being measures

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Abstract

Objectives

To explore the internal constructs of the concepts being measured by EQ-5D-5L (a health-related quality of life measure that can produce preference-based utility values) and the 12-item General Health Questionnaire (GHQ-12, a mental well-being measure), and to understand to what extent the items of EQ-5D-5L and GHQ-12 associate with each other.

Methods

We used data from 12701 respondents participating in a Belgian survey in 2022. Correlation coefficients between GHQ-12 and EQ-5D-5L were calculated at both the aggregate and item levels. Multidimensional scaling (MDS), exploratory factor analysis (EFA) and regression models were performed to investigate the underlying constructs that are associated with the items.

Results

Despite a moderate correlation (0.39) between the EQ-5D-5L and GHQ-12 total scores, only a trivial or weak correlation (<0.3) was observed between the first four EQ-5D-5L items and any GHQ-12 item. MDS and EFA showed the first four EQ-5D-5L dimensions were clustered together with EQ-VAS, positively-phrased GHQ-12 items were close to each other, while EQ-Anxiety/Depression and negatively-phrased GHQ-12 items were grouped with overall life satisfaction. In the regression models, not all GHQ-12 items had a significant coefficient to predict EQ-5D-5L responses.

Conclusion

To the best of our knowledge, we present the first comparison of items and underlying constructs of GHQ-12 and EQ-5D-5L. The results showed that GHQ-12 can only partially predict the responses of EQ-5D-5L and the two instruments measure different constructs. Researchers should carefully consider conceptual legitimacy while applying the mapping technique and consider sensitivity analyses for the mapping estimates.

Key words:

health-related quality of life, mental well-being, mapping, EQ-5D, GHQ-12

Introduction

With limited healthcare resources available, high-quality economic evaluation, which considers both costs and consequences of alternative courses of action, is increasingly needed to optimize resource allocation strategies.[1] Quality-adjusted life-year (QALY) has become a widely used health outcome measure in economic evaluation and generic health-related quality of life (HRQoL) measures that can produce preference-based utility values (hereinafter referred to as preference-based HRQoL measures), have been frequently used to estimate QALY weights.[1] Although generic HRQoL measures can be used across different conditions, they have been found to perform poorly to detect changes or differences in some condition-specific groups, for example, people with vision, hearing, or severe and complex mental health problems.[2, 3] EQ-5D-5L is one of the most commonly used generic HRQoL measures across different diseases and populations,[4] but it has been shown to be not sensitive in people with mental health conditions.[5, 6]

For better measurement of mental health, a series of instruments have been developed, and many of them combine elements of both survey measures and clinical instruments,[7] For example, the 12-item General Health Questionnaire (GHQ-12), is one of the most common tools to screen psychological distress and has been often used as a measure of current mental health since its development.[8, 9]

Because, on the one hand, preference-based HRQoL measures, such as EQ-5D-5L, can be used to obtain QALY weight but may not capture sufficient aspects of mental well-being, on the other hand, mental well-being measures, such as GHQ-12, can provide complementary information but cannot be directly used in QALY-required economic evaluation, it is sensible to find a way to combine the two sets of measures to inform decision making. The impact of the COVID-19 pandemic on mental well-being also further raised the interest in integrating measures such as the GHQ-12 in QALY optimisation applications. A substantial number of studies estimated mapping functions between preference-based and non-preference-based measures, allowing QALY weights to be generated even if no preference-based measure was included.[6, 10, 11] At least three mapping studies between an HRQoL measure (all used EQ-5D-3L) and a mental well-being measure (GHQ-12) have been conducted.[12-14] However, because HRQoL and mental well-being are overlapping, multi-faceted but, by definition, different concepts, simple mathematical algorithms trying to connect the two constructs may not always be appropriate. In fact, several studies have reported a quantifiable, but weak, link between a preference-based HRQoL measure and a generic well-being measure[15] or other condition-specific measures,[16] implying mapping is not always advisable.

Concepts such as HRQoL and mental well-being are vaguely defined in health outcomes research and there have been very few empirical studies showing how these concepts should be defined and what these instruments measure. This is because, first, these concepts are abstract and with complex, broad and multi-faceted constructs. From the measurement point of view, a limited number of outcome measures have conceptual frameworks and/or a good evidence base supporting any claims concerning the underlying construct.[17]

In this study, we aimed to use a series of methods to explore the internal constructs of the concepts being measured by EQ-5D-5L (an HRQoL measure) and GHQ-12 (a mental well-being measure), and to understand to what extent the items of EQ-5D-5L and GHQ-12 associate with each other.

Methods

Survey

We used data from the 'Great Corona Study (GCS)' in Belgium,[18] which has been repeated for 46 waves since 17th March 2020. The survey was open to the general public and aimed to observe a multitude of aspects, including the spread of COVID-19 symptomatic infections,[19, 20] adherence to non-pharmaceutical (NPI)[21] and pharmaceutical interventions (PI)[22, 23] and socio-economic impact of COVID-19 and the NPIs and PIs.[24] It also routinely included self-reported questions to obtain respondents' socio-demographics and mental well-being (as measured by GHQ-12). In the last "open" wave (Wave 46) of the survey (on March 29, 2022), EQ-5D-5L was included and we only used the data from Wave 46.

Due to the open-access nature of the survey, the sample is non-probabilistic and subject to self-selection bias, with male, younger (under 35 years), less educated (secondary or under secondary) people as well as those who lived in French and German-speaking communities of Belgium under-represented relative to the general population. Methods partially accounting for such aspects are described in the section on statistical analyses below.

Measures

We used EQ-5D-5L, which contains a descriptive system and a visual analogue scale (EQ-VAS), to record a respondent's health status on the day of the survey. The descriptive system of EQ-5D-5L describes individuals' health status, each of which can be converted into a health utility score through a value set. The utility scores range from less than 0 (the value of a health state equivalent to dead) to 1 (the value of full health). The Belgian EQ-5D-5L value set[25] was used to convert each respondent's health state into a health utility score in this study. The EQ-VAS records the individual's overall health on a vertical visual analogue scale, taking values between 0 (worst imaginable health) and 100 (best imaginable health).

The 12-item General Health Questionnaire (GHQ-12) can be used as both a screening tool for psychiatric illnesses and a measure of mental health in population surveys.[8, 9] It comprises 6 positively-phrased and 6 negatively-phrased items to assess a person's life in the past week. Each GHQ item is divided into four categories: better, same, worse and much worse. To rate GHQ-12, we used the common approach:[8] for each item, the first two categories were given a score of 0, and the last two categories were scored at 1; the total score of GHQ, i.e., the sum of the scores of the twelve items, lied between 0 and 12 and a higher score indicated a worse condition.

To assess respondents' overall life satisfaction, which is a general measure of subjective well-being, this survey included one question phrased as "On the whole, how satisfied are you with your life nowadays?" Respondents were required to give a value between 0 (extremely unsatisfied) and 10 (extremely satisfied).

Statistical analyses

Descriptive analyses

Descriptive analyses were performed to show socio-demographics, the distribution of EQ-5D-5L utility scores, EQ-VAS and GHQ-12 scores. We obtained the mean, median and interquartile range of the scores for the whole sample and by age and gender subgroups. To explore the association between EQ-5D-5L and GHQ-12 at an aggregate level, we divided GHQ-12 scores into 3 categories:[8]

good (0), moderate (1~3) and poor (>3) mental well-being and obtained mean EQ-5D utility scores and VAS scores in the three GHQ-12 categories.

To improve the representativeness of the data and reduce the bias of unweighted estimators, we calculated summary statistics using inverse probability weighting (IPW) based on age, sex and province obtained from Statistics Belgium.[26] We constrained the maximum weight of a respondent, as at most 40 times higher than the lowest weights in the sample, thus limiting the influence of categories with few respondents, e.g., young, male, less educated people living in a French-speaking community.

Correlation coefficients

Spearman's rank correlation rho between utility scores and GHQ-12, as well as VAS and GHQ-12 scores were calculated. At an item level, Spearman's rank correlation coefficients between each item of EQ-5D-5L and GHQ-12 were calculated. We defined the strength of correlation as follows: trivial: < 0.10; small: 0.10–0.29; moderate: 0.30–0.49; high: 0.50–0.69; very high: 0.70–0.89; nearly perfect: >0.90.[27] The significance level of correlation was not considered in this analysis, as the respective hypothesis tests were overpowered due to the large sample size.

Multidimensional Scaling

Correlation coefficients generally imply the strength of an association between the two sets of items, reflecting how similar the measurements of the two items are across a dataset. The correlation matrix across EQ-5D-5L and GHQ-12 items thus provided us with a pairwise similarity matrix: a larger absolute value indicated a higher level of similarity. With the correlation matrix, we further explored the similarity between the items using multidimensional scaling (MDS). MDS is a method to visualize the similarity between items by plotting points in an n (usually two, for easy interpretation) dimensional graph.[28] The visualisation can help reveal a hidden pattern in the dataset. To investigate the proximity between GHQ-12 items, EQ-5D-5L items, overall health status and overall subjective well-being, EQ-VAS and the satisfaction scores were further added when computing the pairwise correlation matrix. We used k-means clustering to draw clusters in the MDS output, while the optimal number of clusters (n=3) was determined using average silhouette method and elbow method. The proportion of variance explained by the two-dimensional solution was 0.587.

Exploratory factor analysis

Exploratory factor analysis (EFA) was performed to explore the underlying latent constructs that were associated with the items of EQ-5D-5L and GHQ-12. Based on a matrix of item correlations, EFA can reduce the information of various items into a smaller set of components; in other words, it can identify a list of general factors (representing the latent constructs) that can explain the covariances among the measured items.[29] The Kaiser-Meyer-Olkin (KMO) test and Bartlett's test were conducted to check the appropriateness of performing EFA with our data. Eigenvalues, scree plots and the interpretability of the factors were used to determine the number of factors being extracted. Because items of EQ-5D-5L and GHQ-12 are aspects of HRQoL and mental well-being and were considered to be closely related to each other, we used the Promax rotation to extract factors, as it allowed greater correlation values between factors[30] and has a better ability to handle large datasets efficiently.[31] Only the factor loading that was larger or equal to 0.3 was reported for each item.

Regression analyses

We developed regression models to assess the relationship between the responses of EQ-5D-5L and GHQ-12. The five dimensions of EQ-5D, the EQ-5D-5L utility values as well as VAS were treated as the dependent variables. For EQ-5D-5L utility values and VAS, linear regression models were constructed; for EQ-5D-5L dimensions, ordered logistic regression models were used.

The total GHQ-12 scores were treated as independent variables (we recoded GHQ-12 using "Likert" scoring, where each level was assigned from 0 to 3 and the overall score was from 0 to 36 to run a robustness test); meanwhile, we also developed dummy variables for GHQ-12 items as independent variables to further assess the relationship between separate GHQ-12 items and the responses of EQ-5D-5L. We expected there to be a limited (and lower) association between GHQ-12 items and the first four EQ-5D-5L dimensions (except anxiety/depression), although there can be some spillover effects with, for example, pain/discomfort. Socio-demographics were used as additional covariates. Concerning the large dataset with a high power, we considered the independent variables to be important if they had a p-value smaller than 0.01.

Data analysis was conducted in R,[32] version 4.2.1.

Results

In total, 12701 responses were collected. It is required that all questions included in the survey were answered to submit the filled-in response, and in other words, there was no missingness among the collected responses. The demographic characteristics are presented in Table 1.

Weighted summary statistics, including mean, median and interquartile range of EQ-5D-5L utility, VAS and GHQ-12 scores are presented in Table 2. Health status in terms of EQ-5D-5L utility and VAS scores generally decreased when age increased, although people aged between 45 and 64 years reported a lower score compared to those between 65 and 74 years. On the contrary, mental well-being was worse in young people (under 34 years) compared to older people. Individuals aged between 65 and 74 reported the lowest mean GHQ-12 score, indicating the best mental well-being in this age group. The means of EQ-5D-5L utility and VAS scores by GHQ-12 categories (good, moderate and poor mental well-being) and by demographic characteristics can be found in Appendix A.Table 1. Individuals with a worse mental well-being state reported a lower utility and VAS score in both genders and all age and all education groups.

We observed a moderate association between EQ-5D-5L utility and GHQ-12 as well as between VAS and GHQ-12, with a Spearman correlation coefficient of -0.39 and -0.31, respectively. Despite a clear correlation between EQ-5D-5L and GHQ-12 at an aggregate score level, the correlation between the items was less clear (Appendix A.Figure 1). The internal correlation between the GHQ-12 items was at least moderate. The correlation between the first four dimensions of EQ-5D was moderate to high. Only a trivial or small correlation was observed between the first four EQ-5D dimensions and all GHQ-12 items, while anxiety/depression had a small to moderate correlation with GHQ-12 items.

Similarities/dissimilarities between the items as visualised by MDS can be found in Figure 1. We opted for a two-dimensional solution for this dataset (the proportion of variance explained by the first two dimensions: 0.587), because it can provide more information about data structure than a one-dimensional solution and is easier for interpretation compared to a higher-dimensional solution. The first four dimensions of EQ-5D-5L were clustered together with EQ-VAS (a general score of overall health status), positively-phrased GHQ-12 items were close to each other, while the EQ-

Anxiety/Depression dimension and negatively-phrased GHQ-12 items were grouped with the overall life satisfaction score (a general measure of overall subjective well-being).

The Kaiser-Meyer-Olkin (KMO) test reported a result of 0.92 and a Bartlett's test reported a P value close to 0, which both indicated our data were useful for factor analysis. The rule of eigenvalues and a scree plot (Appendix A.Figure 2) suggested a 3- and 4-factor solution, respectively. We decided to use a 4-factor solution (Table 3) because it explained more of the total variance and the extracted factors were interpretable. The four factors explained 23%, 13%, 13% and 12% variance, respectively. The first factor included the six positively-phrased GHQ-12 items; the second factor included negative mental effect items "lost confidence in self", "thought of self as a worthless person", "felt unhappy and depressed' from GHQ-12 and "anxiety/depression" from EQ-5D-5L; the third factor included GHQ-12 items on worrying and stress: "lost sleep over worry", "felt constantly under strain", "felt couldn't overcome difficulties" and "felt unhappy and depressed"; the fourth factor included the first four EQ-5D dimensions. Note that the item "felt unhappy and depressed" loaded on both factor three and four.

The results of regression (used GHQ-12 items and aggregate scores as independent variables, respectively) are presented in Tables 4 and 5. The aggregate GHQ-12 scores had a significantly negative relationship with EQ-5D-5L utility values and VAS, after controlling for relevant demographic variables. Recoding GHQ-12 using "Likert" scoring did not change this significantly negative relationship (A.Table 2). Not all GHQ-12 items had a significant coefficient to predict EQ-5D-5L utility scores or EQ-VAS, although all five dimensions of EQ-5D-5L had a significant coefficient in predicting EQ-VAS. Despite the large sample size bringing enough statistical power to detect significant effects for each item level separately, we also verified the joint significance of the coefficients per item, and found 11 of the 12 items to be significant. Interestingly, the insignificant item was "able to face up to problems".

The first four dimensions of EQ-5D-5L were not significantly associated with most of the GHQ-12 items, while anxiety/depression had a significant association with most GHQ-12 items, except felt to be playing useful part in things, capable of making decisions and able to face up to problems. Felt unhappy and depressed more than usual suggested a higher probability of having problems in mobility, usual activities and pain/discomfort. Thought of self as a worthless person more than usual was associated with a higher probability of having problems in mobility and self-care. Being able to concentrate less than usual was related to having more problems in usual activities and pain/discomfort. Couldn't overcome problems more than usual indicated a higher probability of having problems in usual activities. Lost sleep over worry more than usual and felt constantly under strain more than usual were related to having more problems in pain/discomfort.

Discussion

To our knowledge, our study is the first to explicitly investigate the relationship between GHQ-12 and EQ-5D-5L, while previous mapping studies trying to connect EQ-5D and GHQ-12 responses all used EQ-5D-3L data. We reported worse mental well-being state to be associated with worse health status, which was similar to the finding in the UK study that higher GHQ-12 scores implied larger probabilities of having worse EQ-5D-3L levels.[14] Our study found the coefficient of GHQ-12 aggregate score to be -0.018 when predicting EQ-5D-5L utility values, which was similar to the coefficient (-0.019) in the Swedish study, although they used EQ-5D-3L and only controlled for age, gender and self-rated health status.[13] Another study in Spain applied linear regression[12] to find that only "being able to concentrate" and "lost sleep over worry" had significant coefficients.

While underneath the instruments, most of the GHQ-12 items, representing various aspects of mental well-being, did not have a significant relationship to predict EQ-5D-5L items. In our study, we only found anxiety/depression was significantly associated with most of the mental well-being items, while the other four health dimensions were not. The results from correlation coefficients, MDS and EFA further supported this. Only a trivial or small correlation was observed between the first four EQ-5D-5L dimensions and all GHQ-12 items. The first four EQ-5D-5L dimensions were also grouped as a separate factor/cluster, as compared to GHQ-12 items. This may indicate that EQ-5D-5L and GHQ-12 define and measure at least two different constructs: physical health and mental well-being. It therefore questions the legitimacy of using a pure mathematical mapping function to connect the two instruments, considering that - without a completely valid conceptual basis - such a function could generate invalid QALY weights, which may lead to biased resource allocation strategies.[33] However, Gamst-Klaussen et al argued that mapping is plausible and feasible as long as the target instrument covers key dimensions of the source instrument.[34] Therefore, if there are only GHQ-12 responses available and QALYs are needed, using the mapping technique would seem acceptable, given that the key dimensions of the GHQ-12 are captured by one of the dimensions of the EQ-5D. Nonetheless, researchers should carefully consider conceptual legitimacy while applying the mapping technique, consider sensitivity analyses for these estimates in cost-utility analysis and, of course, include EQ-5D questionnaires directly in study designs, whenever possible.

This study explored the internal constructs of GHQ-12 and EQ-5D-5L. The output of our EFA was very similar to previous discussions of the composition of GHQ-12.[35, 36] As they proposed, GHQ-12 items loaded on three factors, labelled as “Social dysfunction” (all positively-phrased items), “Anxiety and depression” (“lost sleep over worry”, “felt constantly under stress”, “felt couldn’t overcome difficulties” and “felt unhappy depressed”) and “Loss of confidence” (“lost confidence in self” and “thought of self as a worthless person”). This structure was almost the same as our output, except in our study, “felt unhappy and depressed” loaded on both the second and third factors. We did not identify studies that have specifically explored the underlying latent constructs that are associated with the items of GHQ-12 and EQ-5D, but we found studies that have used factor analysis to investigate the constructs of other mental well-being or general well-being instruments and preference-based HRQoL measures and produced similar results. Gamst-Klaussen et al used EFA and found the degree of conceptual overlap between their source instruments (two depression measures) and target instrument, EQ-5D-5L to be limited, and indicated this as one of their study limitations.[34] One study investigated the overlap between HRQoL measures and a capability well-being measure (ICECAP-A) and found that ICECAP-A provided additional complementary information when compared with the HRQoL measures.[37] Another study examined the dimensionality of HRQoL measures (EQ-5D-5L, SF-36 and PROMIS-19) and well-being measures (ICECAP, WEMWEBS and ONS-4).[38] The authors found that EQ-5D tapped into aspects of health including physical functioning, psychological symptoms and pain but did not capture aspects related to social functioning, energy/sleep, needs and satisfaction. From the aspects that were missing from the descriptive system of EQ-5D, bolt-ons for EQ-5D[38] and new measures that encompass aspects of health and well-being (EQ-HWB)[39] can be developed to capture broader aspects of quality of life. Similarly, one study on Asthma patients proved a complementary relationship between subjective well-being and HRQol measures.[40]

Apart from factor analysis, our study used MDS to provide visual representations highlighting the interrelations among the items of GHQ-12 and EQ-5D-5L. The output of MDS demonstrated that the two instruments measured different constructs: mental well-being and health. It was found that the first four EQ-5D-5L dimensions, which are physical health items, were clustered with a general score of overall health status (EQ-VAS), positively-phrased GHQ-12 items were close to each other, while

EQ-Anxiety/Depression, negatively-phrased GHQ-12 items were grouped with a general measure of overall subjective well-being (satisfaction). This may imply that at least three different constructs were measured by the two instruments: physical health, positive mental well-being and negative mental well-being. It may also imply that physical health is closely related to self-rated health status, while negative mental well-being is closely related to subjective well-being status. The previous studies have investigated the association among physical health, mental well-being, self-rated health and subjective well-being,[41-43] while our study further shows the proximity of the above-mentioned concepts. We encourage studies to further explore the above-mentioned relations, for example, by employing qualitative methods to gain in-depth insights into individuals' subjective perceptions of the self-reported outcomes as well as investigating longitudinal data to establish possible causal relationships.

Both EFA and MDS in this study were based on the correlation matrix showing the intercorrelations between the included items,[44] therefore they showed similar results. The reason for including both of the approaches was that, one the one hand, MDS can present graphical information, which has the advantage of being intuitive and readily interpretable. In addition, while EFA has been commonly used to evaluate whether specific health items can be grouped into factors, adding an item representing overall health status (VAS), jointly with specific health items (the EQ-5D-5L dimensions) does not align with the logic of EFA. We can however add the overall health item (VAS) in the MDS analysis to observe and compare the proximity between overall health and various health/well-being items. MDS has been recognised as a complementary method in the validation and analysis of quality of life data[45] and our study further proved its usefulness in quality of life research.

Our study has the following limitations. First, we used data from an online survey which inevitably introduced respondent selection biases. Socio-economically disadvantaged people, for example, those who had limited access to the internet were less likely to be sufficiently represented in this study. As with any type of non-census research, people who were predisposed as being less interested or less inclined to devote their time to a questionnaire are also omitted from the survey population. We note that we performed IPW to mitigate sampling unbalance in the data related to observed variables, but latent processes leading to such unbalance cannot easily be corrected for. Second, because GHQ-12 and EQ-5D-5L are both self-reported outcome measures, the responses can be subject to differential item functioning,[46] that is, the systematic differences that occur when people with different demographic background (eg. age and gender) interpret and select response categories. The underlying constructs of GHQ-12 and EQ-5D-5L may therefore have different patterns in different population subgroups due to differential item functioning, but it was not investigated in this current study and needs further analysis.

Conclusions

In this study, we explored the constructs of HRQoL and mental well-being, as defined and measured by EQ-5D-5L and GHQ-12, respectively. The results showed that the two instruments provided complementary information and GHQ-12 can only partially predict the responses of EQ-5D-5L. Therefore, mathematical algorithms trying to directly estimate EQ-5D-5L scores from GHQ-12 scores will result in the loss of information. Further research is required to elaborate whether it would be conceptually appropriate to use alternative ways to derive EQ-5D-5L changes from (partial information) in GHQ-12 changes. Because there is a substantial number of studies that estimated mapping functions between a preference-based measure and other non-preference-based measures, our study implies that the conceptual legitimacy of such mapping work should be further assessed and discussed.

References:

1. Drummond MF, Sculpher MJ, Claxton K, Stoddart GL, Torrance GW. Methods for the Economic Evaluation of Health Care Programmes. New York: Oxford University Press, 2015.

2. Streiner DL, Norman GR, Cairney J. Health Measurement Scales: A Practical Guide to Their Development and Use. USA: Oxford University Press, 2015.

3. Rowen D, Brazier J, Ara R, Azzabi Zouraq I. The role of condition-specific preference-based measures in health technology assessment. *Pharmacoeconomics*. 2017;35(1):33-41.

4. Devlin NJ, Brooks R. EQ-5D and the EuroQol group: past, present and future. *Appl Health Econ Health Policy*. 2017;15(2):127-137.

5. Brazier J. Is the EQ–5D fit for purpose in mental health? *Br J Psychiatry*. 2010;197(5):348-349.

6. Brazier J, Connell J, Papaioannou D, et al. A systematic review, psychometric analysis and qualitative assessment of generic preference-based measures of health in mental health populations and the estimation of mapping functions from widely used specific measures. *Health Technol Assess*. 2014;18(34):vii-188.

7. McDowell I. Measuring Health: A Guide to Rating Scales and Questionnaires. USA: Oxford University Press, 2006.

8. Goldberg DP, Gater R, Sartorius N, et al. The validity of two versions of the GHQ in the WHO study of mental illness in general health care. *Psychol Med*. 1997;27(1):191-197.

9. Goldberg D, Williams P. General health questionnaire (GHQ). Swindon, Wiltshire, UK: nferNelson, 2000.

10. Mukuria C, Rowen D, Harnan S, et al. An updated systematic review of studies mapping (or cross-walking) measures of health-related quality of life to generic preference-based measures to generate utility values. *Appl Health Econ Health Policy*. 2019;17(3):295-313.

11. HERC database of mapping studies, Version 8.0. Available from: http://www.herc.ox.ac.uk/downloads/herc-database-of-mapping-studies. Accessed Oct 17 2023.

12. Serrano-Aguilar P, Ramallo-Fariña Y, Trujillo-Martín MDM, et al. The relationship among mental health status (GHQ-12), health related quality of life (EQ-5D) and health-state utilities in a general population. *Epidemiol Psychiatr Sci*. 2009;18(3):229-239.

13. Lindkvist M, Feldman I. Assessing outcomes for cost-utility analysis in mental health interventions: mapping mental health specific outcome measure GHQ-12 onto EQ-5D-3L. *Health Qual Life Outcomes*. 2016;14:134.

14. Webb EJ. An item-response mapping from general health questionnaire responses to EQ-5D-3L using a general population sample from England. *Appl Health Econ Health Policy*. 2022;21(2):327-346.

15. Franklin M, Payne K, Elliott RA. Quantifying the relationship between capability and health in older people: Can't map, Won't map. *Med Decis Making*. 2018;38(1):79-94.

16. Dzingina MD, McCrone P, Higginson IJ. Does the EQ-5D capture the concerns measured by the Palliative care Outcome Scale? Mapping the Palliative care Outcome Scale onto the EQ-5D using statistical methods. *Palliat Med*. 2017;31(8):716-725.

17. Kind P, Luo N. EQ-5D : What does it measure – and how would we (do we) know ? , 37th EuroQoL Plenary meeting. Virtual Meeting, 2020.

18. The Great Corona Study. Available from: https://www.uantwerpen.be/en/projects/great-corona-study/. Accessed Dec 13th 2022.

19. Neyens T, Faes C, Vranckx M, et al. Can COVID-19 symptoms as reported in a large-scale online survey be used to optimise spatial predictions of COVID-19 incidence risk in Belgium? *Spat Spatiotemporal Epidemiol*. 2020;35:100379.

20. Vranckx M, Faes C, Molenberghs G, et al. A spatial model to jointly analyze self‐reported survey data of COVID‐19 symptoms and official COVID‐19 incidence data. *Biom J*. 2023;65(1):2100186.

21. Six F, De Vadder S, Glavina M, Verhoest K, Pepermans K. What drives compliance with COVID‐19 measures over time? Explaining changing impacts with goal framing theory. *Regul Gov*. 2023;17(1):3-21.

22. Wynen J, Op de Beeck S, Verhoest K, et al. Taking a COVID-19 vaccine or not? Do trust in government and trust in experts help us to understand vaccination intention? *Adm Soc*. 2022;54(10):1875-1901.

23. Valckx S, Crèvecoeur J, Verelst F, et al. Individual factors influencing COVID-19 vaccine acceptance in between and during pandemic waves (July–December 2020). *Vaccine*. 2022;40(1):151-161.

24. Beckers J, Weekx S, Beutels P, Verhetsel A. COVID-19 and retail: The catalyst for e-commerce in Belgium? *J Retail Consum Serv*. 2021;62:102645.

25. Bouckaert N, Cleemput I, Devriese S, Gerkens S. An EQ-5D-5L Value Set for Belgium. *PharmacoEconomics-open*. 2022;6(6):823-836.

26. Statistics Belgium. Population data. Available from: https://statbel.fgov.be/en. Accessed Nov 7 2023.

27. Hopkins W. A new view of statistics: a scale of magnitudes for effect statistics. Available from: https://www.sportsci.org/resource/stats/effectmag.html. Accessed June 12 2023.

28. Dunn-Rankin P, Knezek GA, Wallace SR, Zhang S. Scaling Methods. Psychology Press, 2014.

29. Floyd FJ, Widaman KF. Factor analysis in the development and refinement of clinical assessment instruments. *Psychol Assess*. 1995;7(3):286.

30. Costello AB, Osborne J. Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Pract Assess Res Eval*. 2005;10(1):7.

31. Yong AG, Pearce S. A beginner's guide to factor analysis: Focusing on exploratory factor analysis. *Tutor Quant Methods Psychol*. 2013;9(2):79-94.

32. R Development Core Team. R: A language and environment for statistical computing. Vienna: R Foundation for Statistical Computing, 2013.

33. Round J, Hawton A. Statistical alchemy: conceptual validity and mapping to generate health state utility values. *Pharmacoeconomics-open*. 2017;1(4):233-239.

34. Gamst-Klaussen T, Lamu AN, Chen G, Olsen JA. Assessment of outcome measures for cost–utility analysis in depression: mapping depression scales onto the EQ-5D-5L. *BJPsych Open*. 2018;4(4):160-166.

35. Gao F, Luo N, Thumboo J, et al. Does the 12-item General Health Questionnaire contain multiple factors and do we need them? *Health Qual Life Outcomes*. 2004;2:63.

36. Graetz B. Multidimensional properties of the general health questionnaire. *Soc Psychiatry Psychiatr Epidemiol*. 1991;26(3):132-138.

37. Engel L, Mortimer D, Bryan S, Lear SA, Whitehurst DG. An investigation of the overlap between the ICECAP-A and five preference-based health-related quality of life instruments. *Pharmacoeconomics*. 2017;35(7):741-753.

38. Finch AP, Mulhern B. Where do measures of health, social care and wellbeing fit within a wider measurement framework? Implications for the measurement of quality of life and the identification of bolt-ons. *Soc Sci Med*. 2022;313:115370.

39. Brazier J, Peasgood T, Mukuria C, et al. The EQ-HWB: overview of the development of a measure of health and wellbeing and key results. *Value Health*. 2022;25(4):482-491.

40. de Albornoz SC, Chen G. Relationship between health-related quality of life and subjective wellbeing in asthma. *J Psychosom Res*. 2021;142:110356.

41. Tan RL-Y, Yang Z, Igarashi A, Herdman M, Luo N. How do respondents interpret and view the EQ-VAS? A qualitative study of three Asian populations. *Patient*. 2021;14(2):283-293.

42. Krause NM, Jay GM. What do global self-rated health items measure? *Med Care*. 1994:930-942.

43. Siahpush M, Spittal M, Singh GK. Happiness and life satisfaction prospectively predict self-rated health, physical health, and the presence of limiting, long-term health conditions. *Am J Health Promot*. 2008;23(1):18-26.

44. Jaworska N, Chupetlovska-Anastasova A. A review of multidimensional scaling (MDS) and its utility in various psychological domains. *Tutor Quant Methods Psychol*. 2009;5(1):1-10.

45. Kemmler G, Holzner B, Kopp M, et al. Multidimensional scaling as a tool for analysing quality of life data. *Qual Life Res*. 2002;11(3):223-233.

46. Knott RJ, Lorgelly PK, Black N, Hollingsworth B. Differential item functioning in quality of life measurement: An analysis using anchoring vignettes. *Soc Sci Med*. 2017;190:247-255.

Tables and Figure

	Without weights	With weights
Gender		
Male	4276 (33.67%)	5720.43 (45.04%)
Female	8400 (66.14%)	6980.57 (54.96%)
Other	25 (0.20%)	0
Age Group		
<25	266 (2.09%)	382.57 (3.01%)
25-34	963 (7.58)	1507.60 (11.87%)
35-44	1779 (14.01%)	2156.34 (16.98%)
45-54	2322 (18.28)	2523.24 (19.87%)
55-64	3180 (25.04)	2768.52 (21.80%)
65-74	3521 (27.72%)	2359.92 (18.58%)
>=75	670 (5.28)	1002.82 (7.90%)
Education		
Primary	126 (0.99%)	214.74 (1.69%)
Secondary	3458 (27.23%)	5984.44 (47.12%)
Professional Bachelor	4507 (35.49%)	2447.35 (19.27%)
University Bachelor/Master	3951 (31.11%)	3241.25 (25.52%)
PhD	446 (3.51%)	406.27 (3.20%)
Other	213 (1.68%)	406.95 (3.20%)
Province		
Flanders	11983 (94.35%)	10821.23 (85.20%)
Brussels	277 (2.18%)	778.05 (6.13%)
Wallonia	305 (2.40)	1054.74 (8.30%)
NA	136 (1.07%)	46.98 (0.37%)
Underlying health condition		
Yes	4385 (34.51%)	4325.59 (34.06%)
No	8321 (65.49%)	8375.41 (65.94%)
Living with others		
Live alone	2716 (21.38%)	2909.98 (22.91%)

Live with others	9985 (78.62)	9791.02 (77.09%)
Relationship		
Live with partner	8761 (68.98%)	8317.28 (65.49%)
Have a partner but don't live together	822 (6.47%)	899.60 (7.08%)
Have no partner	2885 (22.71%)	3225.56 (25.40%)
Other	227 (1.79%)	253.42 (2.00%)
NA	6 (0.05%)	5.14 (0.04%)
Employment		
Fulltime	4775 (37.60%)	5562.94 (43.80%)
Retired	4534 (35.70%)	3819.50 (30.07%)
Unemployed	1338 (10.53%)	1623.49 (12.78%)
Part-time	2054 (16.17%)	1695.07 (13.35%)
Income		
Decreased a lot	431 (3.39%)	469.06 (3.69%)
Decreased	1773 (13.96%)	1817.44 (14.31%)
Same	7952 (62.61%)	7452.35 (58.68%)
Increased	2435 (19.17%)	2808.21 (22.11%)
Increased a lot	110 (0.87%)	153.93 (1.21%)
Making ends meet		
Very easy	2739 (21.57%)	2387.35 (18.80%)
Easy	4204 (33.1%)	3822.51 (30.10%)
Somewhat easy	4021 (31.66%)	4359.02 (34.32%)
Difficult	1443 (11.36%)	1730.42 (13.62%)
Very difficult	294 (2.31%)	401.70 (3.16%)
Any current COVID-19 symptoms		
Yes	4376 (34.45%)	4564.25 (35.94%)
No	8325 (65.55%)	8136.75 (64.06%)

Table 1: Demographic characteristics (n=12701)

		EQ-5D utility	EQ-5D VAS	GHQ-12	
Gender	**Age group**	**Summary statistics**	**Summary statistics**	**Summary statistics**	**N**

Male	14-24	0.90 [0.92] (0.83 1.00)	75.96 [82.00] (70.00 90.00)	2.78 [1.00] (0.00 5.00)	166
Male	25-34	0.88 [0.90] (0.83 1.00)	76.09 [80.00] (70.00 89.00)	2.94 [1.00] (0.00 5.00)	576
Male	35-44	0.88 [0.90] (0.83 1.00)	75.80 [80.00] (70.00 86.00)	2.43 [0.00] (0.00 3.00)	861
Male	45-54	0.84 [0.90] (0.81 1.00)	70.50 [75.00] (65.00 85.00)	2.13 [0.00] (0.00 3.00)	1065
Male	55-64	0.85 [0.90] (0.81 1.00)	72.15 [76.00] (66.00 85.00)	1.44 [0.00] (0.00 1.00)	1375
Male	65-74	0.87 [0.90] (0.83 1.00)	75.26 [80.00] (70.00 85.00)	0.92 [0.00] (0.00 0.00)	1157
Male	>=75	0.84 [0.90] (0.78 1.00)	72.53 [79.00] (70.00 85.00)	1.34 [0.00] (0.00 0.00)	520
Female	14-24	0.84 [0.90] (0.80 1.00)	73.97 [80.00] (67.00 86.00)	3.43 [3.00] (0.00 5.00)	217
Female	25-34	0.83 [0.87] (0.78 1.00)	72.23 [75.00] (65.00 85.00)	3.15 [1.00] (0.00 6.00)	931
Female	35-44	0.84 [0.90] (0.81 1.00)	72.31 [76.00] (65.00 85.00)	2.50 [0.00] (0.00 4.00)	1295
Female	45-54	0.80 [0.85] (0.78 0.90)	70.37 [75.00] (65.00 84.00)	2.54 [0.00] (0.00 4.00)	1458
Female	55-64	0.82 [0.86] (0.78 0.93)	72.35 [76.00] (65.00 85.00)	1.80 [0.00] (0.00 2.00)	1393
Female	65-74	0.84 [0.90] (0.81 1.00)	73.39 [80.00] (70.00 85.00)	1.28 [0.00] (0.00 1.00)	1203
Female	>=75	0.79 [0.84] (0.73 0.90)	70.01 [75.00] (65.00 81.00)	2.09 [0.00] (0.00 2.00)	483
Pool		0.84 [0.90] (0.80, 1.00)	72.70 [78.00] (67.00, 85.00)	2.04 [0.00] (0.00 3.00)	12701

Table 2: Mean [median] (interquartile) EQ-5D utility, VAS and GHQ-12 scores

	Factor1 loadings	Factor2 loadings	Factor3 loadings	Factor4 loadings
Concentrate	0.83			
Useful	0.91			
Decision	0.86			
Enjoy	0.79			
Face problems	0.69			
Happy	0.68			
Lost confidence		0.97		
Worthless		0.94		
Sleep			0.62	
Strain			1.04	
Overcome			0.71	
Mobility				0.79
Self-care				0.64
Usual activities				0.76
Pain/discomfort				0.65
Anxiety/depression		0.3		
Unhappy		0.43	0.32	

Table 3: Exploratory factor analysis output: four-factor solution

Extraction method: maximum likelihood. Rotation method: Promax rotation.

Only the factor loading that was larger or equal to 0.3 was reported for each item.

		Separate GHQ-12 items				Total GHQ-12 score			
		EQ-5D utility		EQ VAS		EQ-5D utility		EQ VAS	
		Coeff	P value	Coeff	P value	Coeff	P value	Coeff	P value
	(Intercept)	0.936	0	84.319	0	0.943	0	78.708	0
Age group (35-44 as baseline)	<25	0.073	0	2.706	0.011	0.072	0	6.751	0
	25-34	-0.001	0.815	0.46	0.437	-0.005	0.407	0.355	0.593
	45-54	-0.012	0.011	-0.364	0.428	-0.01	0.024	-1.018	0.05
	55-64	-0.001	0.82	0.27	0.563	0.001	0.774	0.049	0.926
	65-74	0.018	0.006	0.538	0.406	0.02	0.002	1.355	0.061
	>=75	-0.003	0.715	0.248	0.769	0	0.975	-0.284	0.764
Gender	Female	-0.019	0	0.875	0.002	-0.019	0	-0.199	0.538
Education (Professional BA as baseline)	Primary	-0.029	0.024	-1.723	0.191	-0.028	0.037	-3.11	0.037
	Secondary	-0.004	0.197	0.092	0.783	-0.004	0.205	-0.143	0.706
	University BA/MA	0.012	0	0.045	0.89	0.012	0	0.809	0.029
	PhD	0.018	0.015	-0.731	0.322	0.017	0.024	0.055	0.948
	Other	-0.014	0.174	1.649	0.108	-0.014	0.177	1.23	0.289
Income (same as baseline)	Decreased a lot	-0.004	0.605	-0.867	0.246	-0.005	0.469	-0.953	0.259
	Decrease	-0.005	0.227	0.152	0.697	-0.006	0.163	-0.14	0.75
	Increase	-0.006	0.101	0.332	0.339	-0.004	0.3	0.411	0.294
	Increase a lot	-0.014	0.304	-2.145	0.127	-0.012	0.381	-2.559	0.107
Employment status (full time as baseline)	Part-time	-0.022	0	-0.29	0.468	-0.022	0	-1.484	0.001
	Retired	-0.045	0	0.569	0.301	-0.045	0	-1.791	0.004
	Unemployed	-0.115	0	-1.61	0.002	-0.119	0	-8.114	0
Make ends meet (somewhat easy as baseline)	Very easy	0.013	0.001	1.92	0	0.017	0	3.367	0
	Easy	0.014	0	1.423	0	0.017	0	2.722	0
	Somewhat difficult	-0.049	0	-0.833	0.071	-0.053	0	-3.568	0
	Difficult	-0.107	0	0.653	0.489	-0.133	0	-5.932	0
Partner	No partner	-0.006	0.164	-0.267	0.545	-0.009	0.043	-0.739	0.139
	Other	-0.009	0.363	0.614	0.537	-0.01	0.307	0.005	0.996
Current symptoms	Yes	-0.001	0.716	-1.066	0	-0.001	0.829	-1.457	0
Long term condition	Yes	-0.059	0	-3.105	0	-0.061	0	-6.576	0
Province	Brussels	0	0.959	0.079	0.929	-0.004	0.671	-0.003	0.998
	Wallonia	-0.022	0.008	3.629	0	-0.025	0.004	2.543	0.007
Living with others	Not alone	0.006	0.2	0.413	0.355	0.006	0.211	0.664	0.188
GHQ-12	Concentrate 2	0.007	0.44	-0.84	0.328				

	Concentrate 3	-0.003	0.747	-3.609	0				
	Concentrate 4	-0.024	0.079	-4.786	0.001				
	Sleep 2	-0.004	0.267	-1.114	0.005				
	Sleep 3	-0.017	0.002	-0.861	0.113				
	Sleep 4	-0.044	0	-0.733	0.436				
	Useful 2	0.01	0.2	0.531	0.516				
	Useful 3	0.003	0.771	0.342	0.723				
	Useful 4	0.005	0.744	-1.556	0.29				
	Decision 2	0.006	0.571	-0.106	0.921				
	Decision 3	0.008	0.52	0.292	0.809				
	Decision 4	-0.008	0.643	-0.981	0.582				
	Strain 2	-0.006	0.216	0.355	0.448				
	Strain 3	-0.014	0.022	0.503	0.425				
	Strain 4	-0.021	0.036	-1.159	0.25				
	Overcome 2	-0.005	0.304	-0.819	0.077				
	Overcome 3	-0.024	0.001	-0.631	0.391				
	Overcome 4	-0.065	0	3.177	0.023				
	Enjoy 2	0.014	0.039	-1.145	0.1				
	Enjoy 3	0.008	0.331	-2.898	0.001				
	Enjoy 4	0.003	0.808	-2.504	0.052				
	Face problem 2	0.001	0.912	0.85	0.418				
	Face problem 3	0.002	0.87	-0.509	0.671				
	Face problem 4	0.001	0.949	-0.298	0.869				
	Unhappy 2	-0.031	0	-1.162	0.008				
	Unhappy 3	-0.046	0	-0.608	0.363				
	Unhappy 4	-0.068	0	0.258	0.835				
	Loss confidence 2	-0.003	0.574	-0.741	0.136				
	Loss confidence 3	-0.001	0.877	0.457	0.576				
	Loss confidence 4	0.001	0.97	0.39	0.818				
	Worthless 2	-0.007	0.13	-0.57	0.198				
	Worthless 3	-0.035	0	-1.439	0.066				
	Worthless 4	-0.099	0	-0.351	0.828				
	Happy 2	0.002	0.806	-0.221	0.78				
	Happy 3	-0.021	0.026	-0.132	0.892				
	Happy 4	-0.059	0	-4.804	0.002				
EQ-5D	Mobility 2			-2.61	0				

	Mobility 3			-3.488	0				
	Mobility 4			-5.127	0				
	Mobility 5			-7.729	0				
	Self-care 2			-1.436	0.068				
	Self-care 3			-2.754	0.06				
	Self-care 4			-5.08	0.031				
	Self-care 5			-6.094	0.115				
	Usual activities 2			-4.136	0				
	Usual activities 3			-7.561	0				
	Usual activities 4			-13.078	0				
	Usual activities 5			-11.798	0				
	Pain/discomfort 2			-4.348	0				
	Pain/discomfort 3			-9.789	0				
	Pain/discomfort 4			-16.924	0				
	Pain/discomfort 5			-22.678	0				
	Anxiety/depression 2			-1.849	0				
	Anxiety/depression 3			-5.311	0				
	Anxiety/depression 4			-10.556	0				
	Anxiety/depression 5			-12.141	0				
Total GHQ-12	GHQ-12 score					-0.018	0	-1.456	0
		Adjusted R^2		Adjusted R^2		Adjusted R^2		Adjusted R^2	
		0.324		0.363		0.291		0.183	

Table 4 Linear regression results on EQ-5D utility values and VAS

Significance level < 1% is highlighted in red

GHQ-12 items: able to concentrate; lost sleep over worry; felt to be playing a useful part in things; felt capable of making decisions; felt constantly under strain; felt couldn't overcome difficulties; able to enjoy normal day-to-day activities; able to face up to problems; felt unhappy and depressed; lost confidence in self; thought of self as a worthless person, felt reasonably happy.

The robustness test, where we recoded GHQ-12 using "Likert" scoring, where each level was assigned from 0 to 3 and the overall score was from 0 to 36, is presented in Appendix, A.Table 2.

		MOB		SC		UA		PD		AD	
		Coeff	P value	Coeff	P value	Coeff	P value	Coeff	P value	Coeff	P value
Age group (35-44 as baseline)	<25	-0.852	0.001	-0.82	0.057	-0.457	0.009	-1.212	0	-0.108	0.48
	25-34	0.196	0.149	0.544	0.01	0.103	0.335	-0.202	0.015	0.309	0
	45-54	0.378	0	0.115	0.505	-0.063	0.457	0.357	0	-0.134	0.066
	55-64	0.531	0	-0.126	0.468	-0.356	0	0.389	0	-0.279	0
	65-74	0.569	0	-0.399	0.072	-0.699	0	0.239	0.006	-0.611	0
	>=75	1.296	0	-0.29	0.292	-0.207	0.157	0.443	0	-0.72	0
gender	Female	0.259	0	-0.044	0.657	0.251	0	0.338	0	0.205	0
Education (Professional BA as baseline)	Primary	0.283	0.135	0.601	0.037	0.179	0.396	0.41	0.016	-0.166	0.444
	Secondary	0.093	0.11	-0.016	0.881	0.088	0.14	0.106	0.017	-0.04	0.468
	University BA/MA	-0.223	0.001	-0.35	0.007	-0.175	0.005	-0.181	0	-0.014	0.798
	PhD	-0.193	0.233	0.475	0.068	0.044	0.757	-0.35	0.001	-0.312	0.013
	Other	0.037	0.825	0.211	0.439	0.158	0.338	0.136	0.314	-0.059	0.721
Income (same as baseline)	Decreased a lot	0.072	0.554	0.221	0.22	-0.032	0.789	0.003	0.976	-0.047	0.684
	Decrease	0.085	0.203	0.042	0.728	0.095	0.152	0.032	0.531	0.086	0.156
	Increase	0.181	0.007	0.231	0.067	0.017	0.801	0.035	0.455	-0.038	0.511
	Increase a lot	0.023	0.949	1.025	0.025	0.359	0.178	0.1	0.615	0.016	0.943
Employ status (full time as baseline)	Part-time	0.322	0	0.424	0.009	0.584	0	0.221	0	0.238	0
	Retired	0.62	0	0.969	0	0.735	0	0.475	0	0.571	0
	Unemployed	1.058	0	1.569	0	1.555	0	1.036	0	0.691	0
Make ends meet (somewhat easy as baseline)	Very easy	-0.38	0	-0.695	0	-0.394	0	-0.216	0	-0.06	0.34
	Easy	-0.239	0	-0.361	0.004	-0.377	0	-0.257	0	-0.083	0.118
	Somewhat difficult	0.371	0	0.713	0	0.484	0	0.445	0	0.235	0.001
	Difficult	0.452	0.001	0.926	0	0.573	0	0.697	0	0.709	0
Partner	No partner	0.152	0.063	0.132	0.335	0.121	0.116	0.02	0.739	0.169	0.013
	Other	0.291	0.064	0.129	0.642	0.304	0.053	0.028	0.829	0.092	0.55
Current symptoms	Yes	-0.007	0.899	-0.088	0.372	0.005	0.919	0.199	0	-0.086	0.061
Long term condition	Yes	1.05	0	1.088	0	0.875	0	0.772	0	0.198	0
Province	Brussels	0.168	0.293	-0.204	0.537	0.023	0.888	-0.151	0.203	0.462	0

	Wallonia	0.1	0.517	-0.051	0.854	0.17	0.249	0.086	0.443	0.857	0
Live with	Not alone	-0.068	0.401	-0.132	0.337	-0.047	0.548	-0.019	0.753	-0.153	0.028
GHQ-12	Concentrate 2	-0.174	0.295	0.057	0.851	0.009	0.958	0.04	0.735	-0.332	0.014
	Concentrate 3	-0.093	0.616	0.138	0.68	0.324	0.066	0.251	0.057	-0.535	0
	Concentrate 4	0.138	0.568	0.115	0.781	0.769	0	0.58	0.002	-0.628	0.002
	Sleep 2	0.055	0.476	-0.187	0.218	0.001	0.989	0.12	0.025	0.1	0.2
	Sleep 3	0.001	0.992	-0.15	0.429	0.081	0.409	0.334	0	0.366	0
	Sleep 4	-0.01	0.952	0.286	0.257	0.015	0.92	0.543	0	0.545	0
	Useful 2	-0.121	0.445	-0.399	0.125	-0.25	0.076	-0.204	0.065	0.113	0.394
	Useful 3	0.016	0.927	-0.284	0.335	-0.011	0.943	-0.003	0.981	0.146	0.326
	Useful 4	0.227	0.36	-0.592	0.138	0.145	0.505	-0.021	0.913	-0.163	0.439
	Decision 2	-0.035	0.865	-0.04	0.904	0.02	0.913	0.032	0.826	-0.221	0.195
	Decision 3	0.07	0.756	0.056	0.878	0.156	0.44	-0.017	0.918	-0.094	0.613
	Decision 4	0.268	0.375	0.689	0.132	0.462	0.084	0.083	0.729	-0.064	0.804
	Strain 2	0.027	0.768	0.035	0.848	0.042	0.666	0.134	0.034	0.217	0.025
	Strain 3	-0.148	0.226	-0.303	0.184	0.07	0.553	0.276	0.001	0.583	0
	Strain 4	0.003	0.985	-0.218	0.482	-0.106	0.521	0.295	0.03	0.475	0.002
	Overcome 2	0.081	0.379	0.196	0.281	0.165	0.083	-0.056	0.37	0.305	0.001
	Overcome 3	0.283	0.037	0.362	0.143	0.403	0.002	-0.048	0.62	0.673	0
	Overcome 4	0.336	0.15	0.481	0.189	0.89	0	0.136	0.465	0.981	0
	Enjoy 2	-0.073	0.603	0.001	0.996	-0.312	0.015	-0.118	0.208	-0.465	0
	Enjoy 3	0.182	0.266	0.21	0.467	-0.022	0.879	-0.003	0.978	-0.588	0
	Enjoy 4	0.147	0.513	0.002	0.996	0.232	0.24	0.093	0.588	-0.878	0
	Face problem 2	-0.024	0.903	-0.221	0.486	-0.184	0.287	0.102	0.469	-0.183	0.249
	Face problem 3	-0.037	0.867	-0.16	0.648	-0.132	0.486	-0.048	0.764	-0.041	0.815
	Face problem 4	-0.038	0.9	0.215	0.626	-0.53	0.045	-0.303	0.206	0.362	0.15
	Unhappy 2	0.236	0.005	0.217	0.194	0.478	0	0.43	0	1.112	0
	Unhappy 3	0.393	0.001	-0.027	0.907	0.459	0	0.603	0	1.52	0
	Unhappy 4	0.082	0.694	-0.536	0.126	0.271	0.145	0.587	0	2.014	0

	Loss confidence 2	0.059	0.518	0.024	0.89	-0.026	0.771	-0.051	0.438	0.426	0
	Loss confidence 3	-0.23	0.116	-0.173	0.503	0.015	0.907	-0.114	0.286	0.627	0
	Loss confidence 4	-0.671	0.015	-0.219	0.593	0.06	0.796	-0.459	0.039	1.031	0
	Worthless 2	-0.016	0.841	0.038	0.804	-0.017	0.819	-0.102	0.082	0.175	0.007
	Worthless 3	0.365	0.006	0.674	0.003	0.086	0.459	0.034	0.741	0.532	0
	Worthless 4	1.003	0	1.351	0	0.278	0.196	0.315	0.13	0.585	0.006
	Happy 2	0.024	0.883	-0.103	0.719	-0.09	0.542	-0.109	0.306	-0.26	0.049
	Happy 3	0.076	0.688	0.143	0.67	0.236	0.169	-0.032	0.808	0.264	0.085
	Happy 4	-0.271	0.309	-0.423	0.339	0.134	0.571	0.17	0.403	0.851	0
Intercepts	1|2	2.926	0	3.704	0	2.079	0	0.873	0	1.708	0
	2|3	4.025	0	5.054	0	3.583	0	2.930	0	3.841	0
	3|4	5.162	0	6.228	0	4.907	0	4.638	0	5.676	0
	4|5	6.981	0	7.589	0	6.942	0	7.739	0	7.770	0

Table 5: Ordered logistic regression results on EQ-5D dimensions

MOB: mobility, SC: self-care, UA: usual activities, PD: pain/discomfort, AD: anxiety/depression; significance level < 1% is highlighted in red.

GHQ-12 items: able to concentrate; lost sleep over worry; felt to be playing a useful part in things; felt capable of making decisions; felt constantly under strain; felt couldn't overcome difficulties; able to enjoy normal day-to-day activities; able to face up to problems; felt unhappy and depressed; lost confidence in self; thought of self as a worthless person, felt reasonably happy.

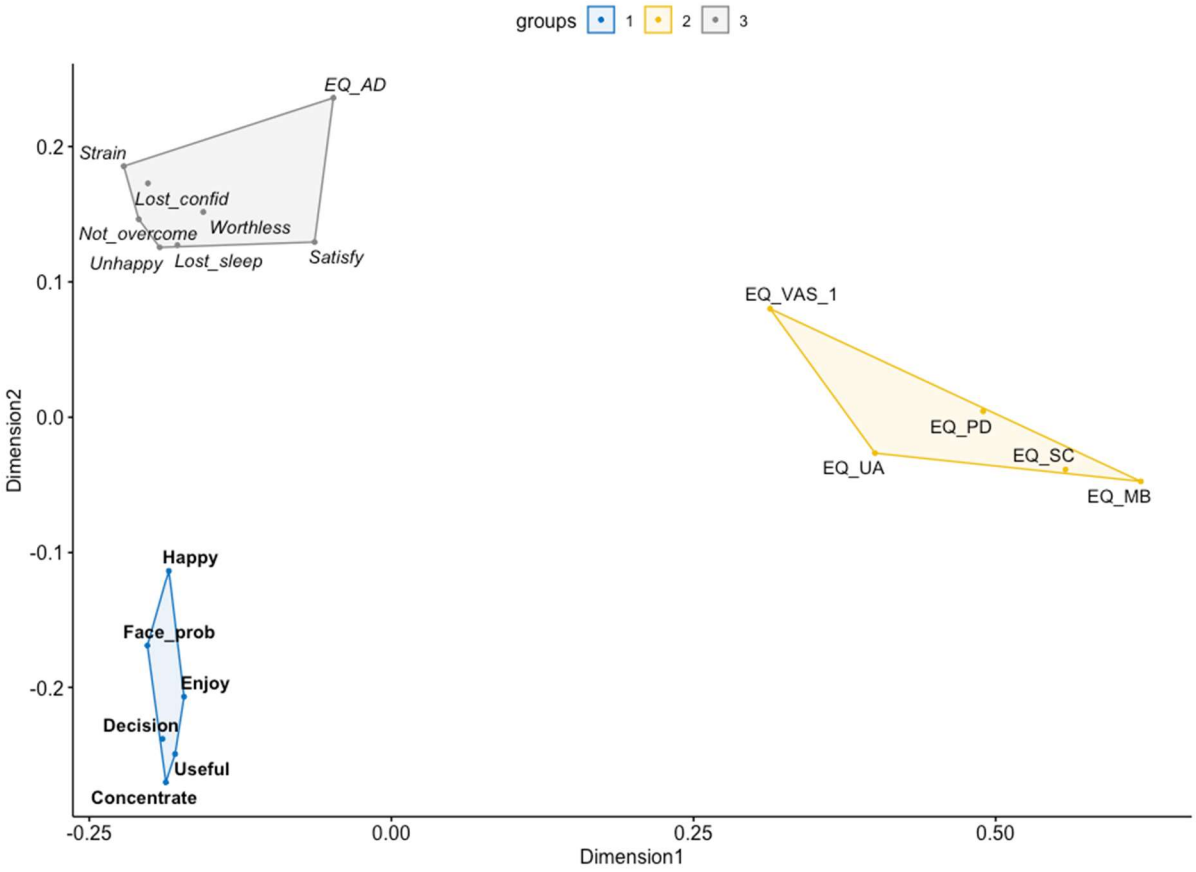

Figure 1: Multidimensional scaling output

Similarity between EQ-5D items, GHQ-12 items, EQ-VAS and the satisfaction scores was visualised by employing multidimensional scaling for the correlation matrix between the individual items.